

- [54] **PLASTIC DISPENSING NOZZLE WITH RECLOSABLE CLOSURE CAP**
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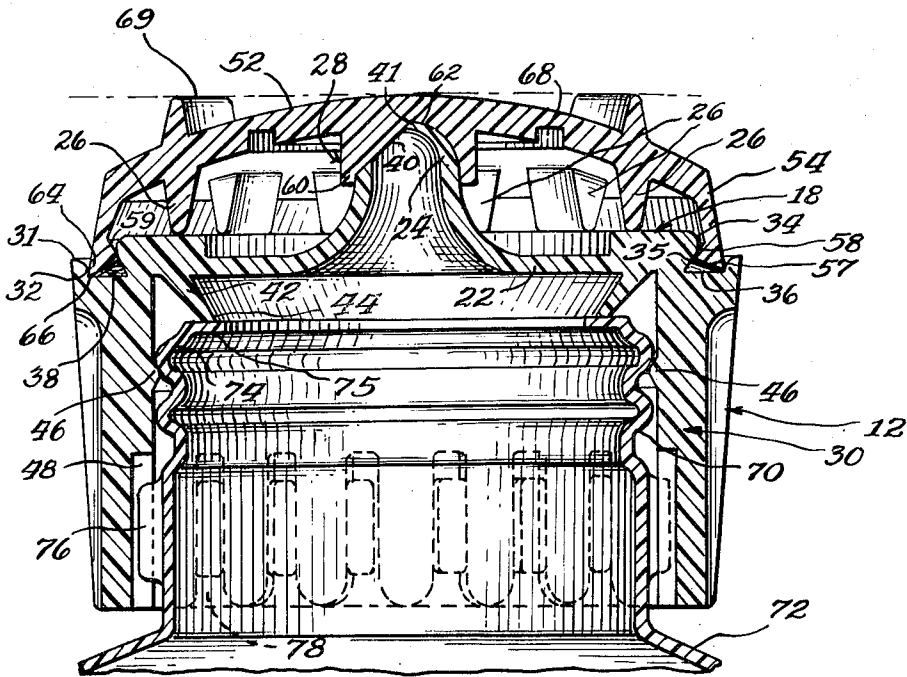
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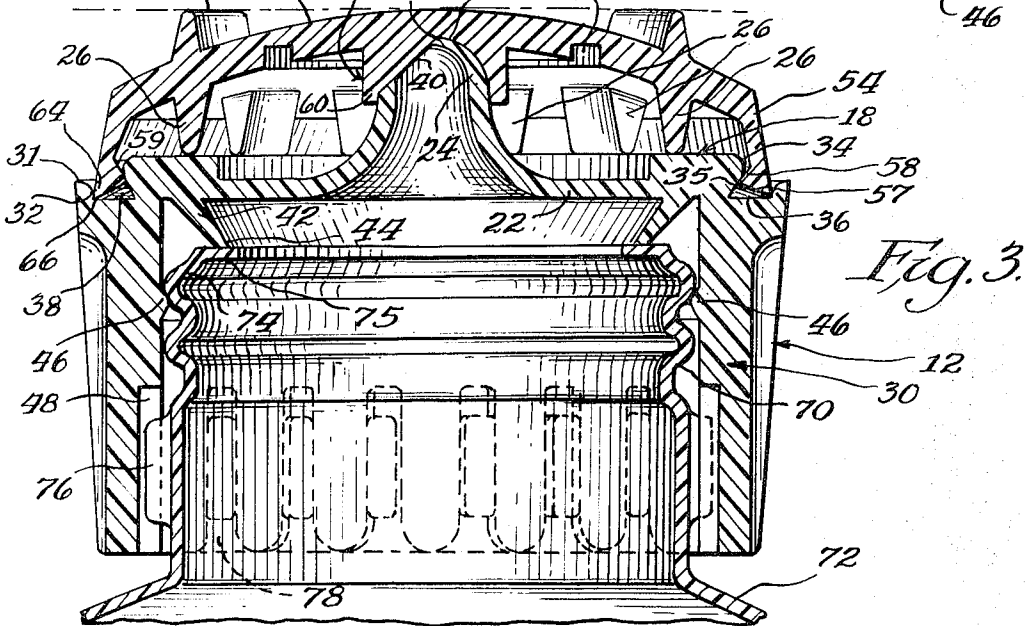
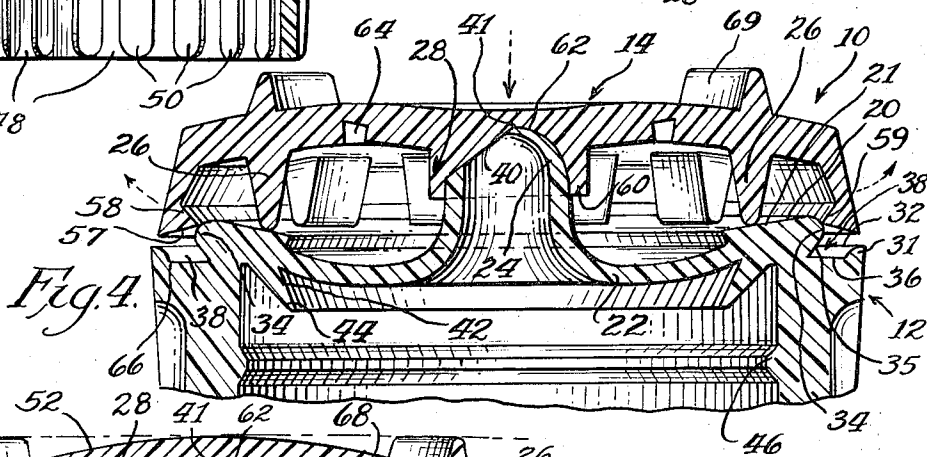
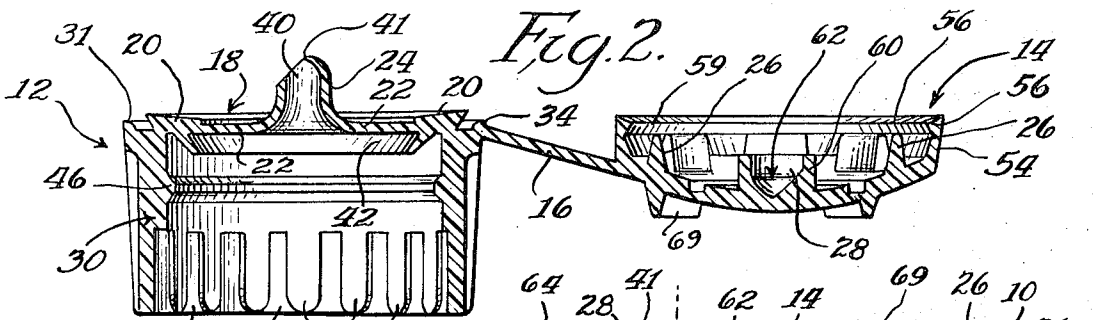
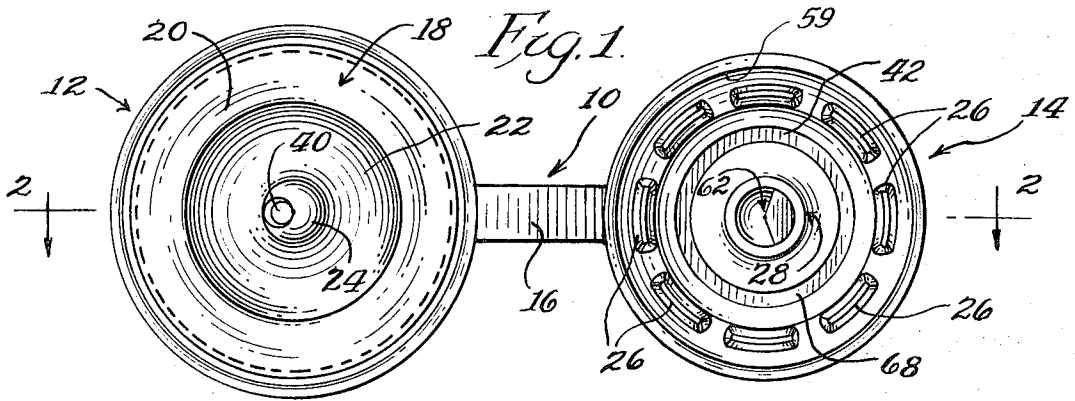
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[57] **ABSTRACT**  
 A plastic dispensing nozzle provided with a flexible diaphragm which has a pouring spout and with a cap for closing the pouring spout, which cap and nozzle have interengaging means so that the cap cannot be removed from its closure position unless pressure is applied to the top central portion of the cap which causes the skirt of the cap to expand and disengage from its locked closure position on the nozzle.

**8 Claims, 4 Drawing Figures**





## PLASTIC DISPENSING NOZZLE WITH RECLOSABLE CLOSURE CAP

### BRIEF SUMMARY OF THE INVENTION

This invention is directed to an improvement in a plastic nozzle and a closure cap for closing said nozzle, the nozzle being provided with a flexible diaphragm extending across the nozzle and with the diaphragm having a centrally positioned upstanding discharge spout, with the closure cap and nozzle interlocking and having cooperating means so that the cap can only be disengaged from its locked closure position on the nozzle by applying pressure on the central portion of the cap to produce a lever or fulcrum action, and wherein the diaphragm is sufficiently resilient and flexible so that when the cap is depressed the diaphragm will flex to accommodate the inward pressure and permit the fulcruming action, and wherein the diaphragm and spout will return to normal position after the cap has become disengaged from its closing position with respect to the nozzle.

Another object of this invention is to provide a nozzle with a spout and where the cap has means for enclosing and sealing the outlet end of the spout when the cap is in closed position, the nozzle being adapted to be attached to the neck of a bottle or container in a seal-proof manner.

Another object of this invention is to provide a nozzle and a captive cap with a pouring spout and means coordinated between the cap and the spout whereby the cap is removed from closing position on the nozzle by pressure applied thereto and wherein the structure is integrally molded of a plastic material.

### BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings:

FIG. 1 is a top plan view of the nozzle and closure cap in the position shown in FIG. 2.

FIG. 2 is a sectional view taken on line 2—2 of FIG. 1.

FIG. 3 is a sectional view with the closure cap fully seated on the nozzle and with the nozzle secured to the neck of a container; and

FIG. 4 is a view showing the closure cap centrally depressed and the skirt of the cap released from its locked closure position on the nozzle.

In general terms, the closure, generally indicated at 10, is integrally formed or molded of a flexible plastic material such as polyethylene and comprises a nozzle generally indicated at 12, and a closure cap generally indicated at 14 connected to the nozzle by a connecting strip 16. The nozzle 12 has an end wall 18 extending across the top or mouth of the nozzle with said end wall having an outer annular peripheral thickened portion 20 and a diaphragm 22 of reduced thickness, which diaphragm is provided with a central upstanding discharge spout 24.

The closure cap 14 is provided on the undersurface thereof with spaced projections 26 which engage the outer peripheral portion 20 of the end wall 18 of the nozzle so that when manual pressure is applied against the central top portion of the cap, the skirt of the cap is expanded and the locking bead thereof raises and disengages from its mating surface on the nozzle thereby releasing the cap from its closed sealing position on the nozzle. The cap is further provided with sealing means

generally indicated at 28 which surrounds the spout opening so that when the closure cap is in closed position on the spout, the spout opening is completely sealed against any accidental discharge of the liquid contents within the container.

More specifically, the nozzle 12 comprises a cylindrical body portion 30 having an annular upwardly extending peripheral edge 31 which has a radius or curvilinear surface 32. The top surface 21 of the outer peripheral portion 20 of the end wall 18 inclines inwardly. The peripheral portion 20 has an outer annular rim 34 which inclines or slopes inwardly as at 35 and which is spaced inwardly of the peripheral edge 31 with a planar surface 36 therebetween which defines an annular space 38 between the peripheral edge 31 and the annular rim 34. The top of the peripheral edge 31 of the nozzle is below the horizontal plane of the top of the outer peripheral portion 20 of the end wall 18. The diaphragm portion 22 of the end wall 18 is of a reduced thickness and is substantially more resilient and flexible than the outer annular peripheral portion 20 of the end wall 18.

Formed integrally with the diaphragm portion of the end wall and centrally thereof is the upstanding discharge spout 24 having a nipple-like configuration provided with a discharge opening 40. The tip portion of the spout has an inclined surface 41 and the opening 40 at said tip is likewise at an inclined angle. This permits the liquid to be dispensed from the container at an angle. It will be understood, however, that the opening 40 may be positioned centrally of the tip so that the liquid could be dispensed in a generally axial direction.

Extending downwardly below the end wall 18 and into the interior of the nozzle is an inwardly inclined annular ring 42 with a tapered lower edge 44. The inner wall of the cylindrical body 30 of the nozzle 12 has an inwardly extending annular rib 46 having opposite sides which incline towards each other and said rib is to engage the bead on the neck of the bottle to lock it therewith. The lower portion of the inner wall of the cylindrical body 30 of the nozzle is provided with spaced vertically extending recesses 48 which form and define spaced vertical ribs 50 between said recesses. The recesses and ribs extend from the bottom of the nozzle, with the top of the recesses and ribs terminating below the annular rib 46.

The closure cap 14 has a generally dome-shaped top wall 52 having a convex outer surface with the inner or under surface thereof concave. Depending from the top wall is the annular skirt portion 54 which flares outwardly and the bottom edge of the skirt is provided with an inwardly extending lip 56 which is formed by the upwardly and inwardly extending bottom sloping wall 57 and the upper sloping wall 58 which meet to form a sharp inner annular edge 59.

The spaced projections 26 extend downwardly from the underside of the dome-shaped top wall and are spaced, as best seen in FIG. 1, to form an interrupted circle, each projection being curvilinear in plan. The projections taper toward the bottom. The projections are adapted to engage the top inwardly inclined surface 21 of the top end wall when the cap is positioned over the nozzle, as shown in FIG. 4, and said projections form levers or fulcrum members for disengaging the cap from the nozzle when a downward manual pressure is applied against the center of the dome-shaped top wall. The spout sealing means 28 is centrally positioned

and is formed on the underside of the cap, with an annular wall 60 defining a central recessed portion 62, the top of which is dome-shaped complementary to the shape of the tip of the spout so that the tip nests and is confined in the recess 62 and the spout opening will be closed and sealed so that no liquid can be accidentally discharged through the spout when the cap is in its closed position.

When the cap is in its closed position, as shown in FIG. 3, the bottom edge of the skirt of the cap will be in engagement with the nozzle and will be locked thereto. The bottom edge of the skirt fits within the annular recess 38 and the outer corner edge 64 of the skirt engages the inner corner 66 of the curvilinear surface 32 of the peripheral edge 31 at an inclined angle, and with the upper sloping wall 58 of the skirt lip engaging the sloping wall 35 of the annular rim 34 of the end wall, and with the sharp edge 59 of the lip 56 engaging the sloping wall 35, so that the bottom edge 57 of the lip of the skirt is positioned at an inclined plane.

It will be seen that the cap in this closing position is locked with respect to the nozzle and that the top of the peripheral edge 31 is above the bottom edge of the skirt of the cap and that no tool or finger of the hand can be inserted in the space between the bottom edge of the skirt of the cap and the peripheral edge 31 of the nozzle to permit the cap to be pried from its closed position. The only way that the cap can be removed from its closing position is by the application of an inward pressure centrally applied, as indicated by the arrow in FIG. 4, against the central portion of the cap and as manual pressure is applied thereagainst the pressure will be transmitted through the spout 24 to the resilient diaphragm 22 to flex the diaphragm downwardly, as shown in FIG. 4. The inwardly extending projections 26 on the cap serve as fulcrums or levers against the top of the end wall of the nozzle and cause the skirt to expand outwardly and the bottom edge of the skirt will disengage and move radially outward with respect to the wall surface of the annular rim 34 of the end wall to become disengaged from the nozzle so that the cap is released from its closure position over the nozzle. After this disengagement the diaphragm as well as the spout will return to normal position, as seen in FIG. 3. To provide for a further flexibility of the cap there is an annular recessed portion 68 in the underside of the top wall of the cap, surrounding but spaced from the central sealing member 28.

The top of the cap is provided with a plurality of spaced upwardly extending projections or lugs 69 which serve as ledges against which the bottom of a container is positioned when a number of containers are positioned in a stacked relation, as shown in dotted lines at the top of FIG. 3. The upwardly extending lugs 69 will prevent the bottom of the superposed container from engaging the central portion of the cap and thereby prevent any accidental pressure being applied to the central portion of the cap and prevent disengagement of the cap with respect to the nozzle.

The nozzle 12 is applied to the neck 70 of a container or bottle 72 by slipping it thereon and the annular rib 46 of the nozzle will engage the annular bead 74 of the neck to retain the nozzle on the neck. The tapered edge 44 of the ring 42 of the nozzle will engage the inwardly extending annular lip 75 at the mouth of the container. The neck of the container is provided with spaced ver-

tically extending ribs 76 providing intervening recesses 78 which are engaged by the recesses and ribs 48 and 50 on the nozzle to prevent rotation of the nozzle relative to the container. Since the cap is held captive to the nozzle there is no likelihood of it becoming lost and after each use it may be reapplied to close the spout opening.

What is claimed is:

1. A nozzle and closure cap for use with a container for dispensing material from said container, said nozzle having means for attachment to a container, said nozzle having an end wall extending across said nozzle, said end wall having a central diaphragm portion and an outer peripheral portion with the central portion having greater elasticity than the outer peripheral portion, said central diaphragm portion of said end wall having a discharge spout formed integrally therewith and extending upwardly thereof, said cap having a skirt with said skirt and nozzle having mating surfaces to interlock said cap with said nozzle so that the cap closes said spout opening, lever means between the underside of said cap and the top end wall of the nozzle and positioned inwardly of the skirt of said cap so that a downward pressure applied against said cap produces a lever action and causes the skirt of the cap to expand and become disengaged from the nozzle, said cap when pressure is applied centrally thereto simultaneously applying a downward pressure against the spout and the end wall of the nozzle to permit said lever action operation, said end wall and spout returning to normal position after said cap has become disengaged from said spout.

2. A structure as set forth in claim 1 in which the central diaphragm portion is of a reduced thickness from that of the adjacent outer peripheral portion of the end wall and in which the discharge spout is positioned centrally of the diaphragm portion, and in which the lever means includes inwardly extending projections on the underside of the cap which engage the outer peripheral portion of the end wall so that the projections fulcrum on the outer peripheral portion to expand the skirt of the cap.

3. A structure as set forth in claim 2 in which the outer peripheral portion of the end wall has an inwardly extending ring which engages the mouth of the container.

4. A structure as set forth in claim 1 in which the top wall of the cap is dome-shaped and in which said top wall has a central sealing member which surrounds the tip of the discharge spout to close and seal the spout opening.

5. A structure as set forth in claim 1 in which the cap is provided with outwardly extending lugs so that containers may be stacked one upon the other and wherein the bottom of the superposed container is free from engagement with the central portion of the cap.

6. A structure as set forth in claim 2 in which the nozzle has an outer peripheral edge and in which the outer peripheral portion of the end wall has an annular peripheral rim spaced inwardly of the outer peripheral edge and defining an annular recess therebetween, and in which the bottom of the skirt of the cap has an inwardly extending lip positionable in said annular recess and mating with the annular peripheral rim.

7. A structure as set forth in claim 6 in which the inwardly extending lip on the bottom of the skirt of the cap has a bottom upwardly extending wall defining a sharp inner annular edge which engages the annular peripheral rim of the nozzle.

8. A structure as set forth in claim 6 in which the cap has sealing means which surrounds the tip of the discharge spout and seals the spout discharge opening.

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